

## Appendix 3.1 – References used to Develop Section 3, Golf Courses

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### Conserving water used by Golf Courses

#### Applicability of This Chapter

The information in this chapter is designed as a resource to guide golf course superintendents (GCSs), golf course owners and managers, and professional organizations and associations involved in golf course development, maintenance, and management. This chapter principally addresses the agronomic practices associated with turfgrass and water use efficiency. However, in the spirit of fostering a culture of conservation, it also addresses water use inside golf facilities and activities that extend beyond the golf community.

Domestic water uses such as those within the clubhouse or management facilities is addressed in the public water supply, Chapter 6. Lawn and landscape maintenance for homeowners and businesses is addressed in Chapter 5 of the Water Conservation Section (WCS).

#### Introduction

Golf courses use most of their water to maintain healthy turfgrass along the course. Irrigation of turfgrass, like agricultural irrigation, varies seasonally. The turfgrass growing season is April through November, and during these months golf course irrigation can be disproportionately large compared to other uses within a region. Even during the irrigation season, irrigation needs are heavily dependent upon weather conditions and precipitation. As of 2005, the 995 acres<sup>1</sup> of golf course in McHenry County consumed almost 1.4 million gallons of water per day, or over 5% of the public water supply.<sup>2</sup>

When supplemental irrigation is needed, GCS and managers depend on groundwater, surface water, and treated wastewater sources. GCSs and managers play a significant role in making sure golf courses are as water efficient as possible. To a large degree, the turfgrass plant is relatively efficient at utilizing water resources, but GCS and turfgrass managers can accentuate the natural efficiency of the turfgrass through many scientifically sound agronomic practices. They can also adopt a variety of best management practices (BMPs) to ensure the application and delivery of applied water is as efficient as possible, eliminating potential of loss and waste. The development of course specific BMPs is an important element of the GCSs' efforts to conserve McHenry County's water resources.

The appropriate practices for conserving water used on golf courses will vary depending on the local weather and soil conditions and the course circumstances. GCSs should develop and implement a best management practices plan (BMPs plan) that provides site-specific operating guidelines that can be used during periods of adequate and limited supply. In general, BMP plans promote sound water and land management and can emphasize water efficiency. A key component of BMPs planning is gathering water use data, and using that information to inform future water management decisions.

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<sup>1</sup> According to the McHenry County Soil Survey there are 391,038 acres in McHenry County.

<sup>2</sup> SIU Regional Water Demand Senarios for Northeastern Illinois: 2005-2050, May 20, 2008.

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#### Chapter Overview

This chapter presents a set of goals for improving the overall water efficiency of golf courses. Following each goal is a set of benchmarks that can be used to measure progress toward these goals. Following each benchmark is a menu of the best practices from this chapter that golf courses can implement to help reach that benchmark or goal. The best practices are accompanied by implementation actions, which are steps to be taken to assist in implementing particular best practices.

#### Goals and Benchmarks: Golf Courses

The goals and benchmarks in this chapter center around the development of course specific BMPs plans and implementing the water conserving practices identified in these plans. The goals also focus on building information and knowledge about baseline golf course water use and sharing that information with those inside and outside of the golf industry. The goals in this chapter recognize the unique nature of each golf course in McHenry County and encourage GCSs and others to adopt practices appropriate to the specific circumstances facing the course, the community, and the water resources.

**GOAL #1 McHenry County Water Resources should work with GCSs and other golf management professionals to form a McHenry County Golf Management Association to achieve the goals and benchmarks presented in this chapter.**

##### **Benchmark 1A**

By September 2010, a McHenry County Golf Management Association should be formed to begin addressing the remainder of the goals in this chapter of the Water Conservation Section.

**GOAL #2 McHenry County Water Resources should work with Golf course superintendents or managers to develop and implement site-specific Best Management Practices (BMP) plans for turfgrass water conservation.**

BMP plans are general guidelines for golf course turf and water management. These plans can ensure that managers incorporate water conservation practices into their decisions. BMP plans are operating guidelines that can guide the GCS's management of water during periods of both adequate and insufficient supply. BMP plans can establish predetermined actions and water use responses in the event that water reductions are necessary. BMP plans should be reviewed and revised every five years.

Many GCS have implemented site-specific BMP plans. Due to typical job loss and turnover, 100% participation is unrealistic. However, the industry should work toward 100% participation in this approach to managing and conserving water on golf courses.

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#### **Benchmark 2A**

By 2011, GCSs in McHenry County should be participating in educational activities regarding BMPs, planning and agronomic practices that affect water use.

*See Best Practice 1*

#### **Benchmark 2B**

By 2012, GCSs in McHenry County should implement conservation practices that are cost-effective and develop an information base that can inform BMPs planning and decisions related to water management.

*See Best Practices 5, 7, 8, 9, 10, and 11*

#### **Benchmark 2C**

By 2011, McHenry County's Golf Courses should have developed site-specific BMPs plans and submitted them to the McHenry County Golf Management Association.

*See Best Practice 1 and 5*

#### **Benchmark 2D**

All new construction Golf Courses and Golf Courses undergoing renovations should consider utilizing BMPs.

*See Best Practices 5 and 12*

#### **Benchmark 2D**

GCSs should review and revise BMPs at least every five years, and resubmit these plans to the McHenry County Water Resource Manager & McHenry County Golf Management Association.

*See Best Practice 5 and 7*

### **GOAL #3**

**Through a cooperative effort, McHenry County Water Resources and the McHenry County Golf Management Association can work with research institutions and golf-related associations to determine a typical water use range for golf courses in Northeastern Illinois that accounts for variations in rainfall and other climatic conditions.**

In order to implement the BMP plan to enhance water use efficiency on golf courses, reliable data is needed to help GCSs understand typical water needs. Reliable data can also help assess the success of water conservation practices.

McHenry County Water Resources and the McHenry County Golf Management Association should work to develop partnerships with the Midwest Association of Golf Course Superintendents (MACGS), Golf Course Superintendents (GCS's), Illinois Department of Natural Resources (IDNR) and United States Golf Association (USGA). The cooperative efforts of these groups should develop a database of reliable, standardized golf course water use data. The database can help determine the typical range of golf course water use over multiple years. This would be a helpful tool for measuring the

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effectiveness of water conservation efforts, newly installed technology and BMPs. Some golf courses have already implemented conservation practices, so even the earliest data may reflect water use with some conservation practices in place.

When determining a typical water use range for golf courses in Illinois, calculations should account for variations in rainfall and other climatic conditions. Water use during drought years should be given special attention when analyzing data and developing recommendations.

After preliminary calculations have been established, GCSs can use this database to measure their own water use more effectively. Since golf courses all face different conditions, direct comparisons should not be made between golf courses, and data should not be used in a punitive manner. GCSs can contribute their own data to the database and begin to assess any improvements in how efficiently water is used on the golf course.

#### **Benchmark 3A**

Establish partnerships with the Midwest Association of Golf Course Superintendents (MACGS), Golf Course Superintendents (GCS's), Illinois Department of Natural Resources (IDNR) and United States Golf Association (USGA).

#### **Benchmark 3B**

By 2012, the above mentioned partnership should standardize techniques and reporting information for monitoring golf course water usage, identify an appropriate entity to maintain a database of collected water use information and begin building that database. The database should be used to record reliable water use data specific to turfgrass maintenance practices for golf courses in Illinois.

*See Best Practice 6*

#### **Benchmark 3C**

From 2012 through 2020, GCSs in McHenry County should report water use information for their golf course facilities to the database.

*See Best Practice 6*

#### **Benchmark 3D**

By December 2018, use database information to identify a typical water use range for golf courses in Illinois that accounts for variations in rainfall and other climatic conditions.

*See Best Practice 6*

#### **Benchmark 3E**

Beyond 2020, jointly demonstrate and document progress toward improved water use efficiency.

*See Best Practices 6 and 7*

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#### **GOAL #4**

**Encourage GCSs and other golf industry groups to help foster a culture of water conservation inside and outside of Illinois's golf industry.**

Since 2004, GCSs in Illinois have been using BMPs plans and practicing the BMPs to improve water use efficiency on golf courses. Their knowledge and experience can be applied to other areas, including those specific to turfgrass management and others. This knowledge and expertise can be shared beyond the golf course.

#### **Benchmark 4A**

By December 2010, McHenry County Water Resources should assist the McHenry County Golf Management Association in their education and outreach efforts to encourage golf course staff to improve water use efficiency inside golf course facilities.

*See Best Practices 2 and 13*

#### **Benchmark 4B**

By 2012, McHenry County Water Resources should utilize the knowledge gained with the McHenry County Golf Management Association to assist with development of site-specific water conservation BMPs for other water users with similar water use patterns, such as sports and athletic field maintenance and professional lawn care.

*See Best Practice 3*

#### **Benchmark 4C**

By 2012, encourage GCSs to participate in educational programs, such as those developed by water providers and landscape and irrigation professionals pursuant to Goal #1 in Chapter 5, that aim to educate homeowners about the importance of water conservation in landscape irrigation.

*See Best Practice 2*

#### **Benchmark 4D**

By 2020, encourage GCSs and other golf industry groups to help educate the non-golfing public regarding water use on golf courses across Illinois.

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#### Best Practices: A Menu of Options

Golf course superintendents and managers can employ a variety of practices to meet the goals and benchmarks in this chapter. These practices fall into four major categories: educational practices, planning practices, data and measurement practices, and water efficiency practices. Lacking support from outside organizations, the local GSC & Golf Management Association of McHenry County should do their best to initiate these practices.

#### Educational practices

##### **BP 1 – Education for GCSs**

The McHenry County Golf Management Association (MCGMA) and/or other golf-related associations should regularly offer educational workshops on agronomic practices that affect water use, water management, water use conservation and BMPs. GCSs and golf course staff, whether or not they are members of the association, should take advantage of these opportunities. Education material should also be developed for golf course architects and construction companies.

##### **Implementation Action:**

- 3.1** MCGMA (and/or the Illinois State Golf Association (ISGA) or other organizations) should offer scholarships to members and nonmembers to help them attend education events.

##### **BP 2 – Education for staff, members, and the community about conservation**

GCSs can develop programs to encourage course employees, club members, and others who use the facilities to conserve water both indoors and outdoors. Programs could include periodic classes at the facility and the distribution of articles, email bulletins, and other informational materials. GCSs should become more involved with local water issues. GCSs should write articles, speak at community events, and act as a local resource on water use efficiency.

##### **Implementation Action:**

- 3.2** The MCGMA, in conjunction with the McHenry County Water Resources should develop educational materials to assist GCSs in educating others on the facts of turfgrass and golf course water use.

##### **BP 3 – Develop BMPs for others**

Work to build partnerships between Golf-related professionals and organizations representing water users with similar water use patterns but that have not adopted the BMPs approach to water conservation. These partnerships should develop BMPs templates for those water users.

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#### Implementation Action:

**3.3** The MCGMA should assist in developing these BMP templates.

#### Planning practice

#### **BP 4 – Best Management Practices (BMP) Plan**

These plans consist of four parts:

- 1) Statement of goals, process, and water conservation philosophy,
- 2) Site assessment and information collection,
- 3) Identification of specific and reasonable BMPs for water-use efficiency, and
- 4) Implementation and review of BMPs plan.

To complete a BMP plan, the GCS should review a facility's existing water management practices and use current technical resources to identify opportunities for improved water-use efficiency and conservation. The GCS should evaluate the elements, as described in detail in the 2007 document "BMPs and Water-Use Efficiency/Conservation Plan for Golf Courses: Template and Guidelines."<sup>3</sup>

- Turfgrass and landscape plant selection
- Use of alternative (non-potable) irrigation water sources
- Irrigation system design and devices for efficient water use
- Irrigation guidance/operation for efficient water use
- Landscape and golf course design for water conservation
- Altering management practices to enhance water use efficiency
- Indoor and other landscape water conservation practices
- Education
- Development of written water conservation and contingency plans
- Monitoring, reviewing, and modifying conservation strategies

Technical resources already exist<sup>4</sup> to help golf courses select the best practices that can be implemented or enhanced to improve how efficiently water is used on courses. GCSs who have already completed BMPs plans are encouraged to offer support and assistance to those who are still developing BMP plans.

BMP plans should be reviewed and revised every five years to identify new water efficiency opportunities and reflect updates in industry best management practices. Any improvements in efficiency that have been realized should be documented.

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<sup>3</sup> information obtained from the Department of Geography and Environmental Resources at the Southern Illinois University Carbondale, "Regional Water Demand Scenarios For Northeastern Illinois: 2005-2050", May 20, 2008. Tables 2.2 and 5.4. (By Carrow et al.)

<sup>4</sup> Available online at  
[http://www.commodities.caes.uga.edu/turfgrass/Illinoisturf/Water/Articles/BMPs\\_Water\\_Cons\\_07.pdf](http://www.commodities.caes.uga.edu/turfgrass/Illinoisturf/Water/Articles/BMPs_Water_Cons_07.pdf)

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#### Implementation Actions:

- 3.4** McHenry County Water Resources should create an archive of BMPs plans and maintain an Up-to-date list of GCSs and golf courses that have completed and filed site-specific BMPs.
- 3.5** Encourage golf industry associations (e.g. MCGMA, ISGA.) to adopt a “code of participation” as criteria for being a member in good standing. This practice can demonstrate a commitment by the GCS and the golf course membership and administration to the BMPs approach to water management.
- 3.6** Encourage MAGCS and or other golf industry associations to provide water conservation and BMPs educational material and workshops offered to members (see BP 1) to nonmembers.
- 3.7** Encourage GCSs to publicize the successful implementation of BMPs at golf courses.

### Data and Measurement Practices

#### **BP 5 – Water use database**

MCGMA should work with research institutions and other associations to build a database of reliable water use data specific to turfgrass maintenance practices for golf courses in Illinois, with assistance from golf courses and managers<sup>5</sup>. This data could be managed by a third-party independent source (e.g. the University system or a research institution) that can guarantee a secure repository that will not be used for regulatory purposes.

This database would rely on GCSs to report data from their course, which they should be able to submit via a secure web site. MCGMA should work with other institutions to establish and promote standard methods for collecting and calculating water use data in order to establish the consistency and uniformity necessary to make the data most useful.

#### Implementation Action:

- 3.8** MCGMA should work with IDNR and/or turfgrass scientists to recommend measurement methods, collection techniques, protocols for monitoring water use, and ways of demonstrating and documenting progress toward greater efficiency on golf courses. MCGMA should consider protocols and methodology established by the Irrigation Association (IA–[www.irrigation.org](http://www.irrigation.org)). These recommendations should be ground-truthed by field testing measurement techniques and protocols at different types of golf courses around the state.

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<sup>5</sup> The most comprehensive manuscript specific to the agronomic practices associated with golf course water use and options for conserving water is “Golf Course Water Conservation: Best Management Practices (BMPs) and Strategies” it is available online at [www.commodities.caes.uga.edu/turfgrass/Illinoisturf/Water/Articles/BMP\\_GCSAA\\_05\\_Chapt\\_ALL\\_ref.pdf](http://www.commodities.caes.uga.edu/turfgrass/Illinoisturf/Water/Articles/BMP_GCSAA_05_Chapt_ALL_ref.pdf)



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#### **BP 6 – Water conservation logs**

Water conservation logs can help GCSs evaluate the effectiveness of water conservation practices and review and revise BMPs plans. Water conservation logs are records of all of the water management choices and water conservation practices that have been implemented at a golf course facility. The log should be ongoing and include data specific to water use and conservation, and justification of practices.

This log can be useful when GCSs need to demonstrate a golf course's water conservation efforts during times of limited supply or drought.

#### **Implementation Action:**

**3.9** MCGMA should develop a model water conservation log.

#### **Water efficiency practices**

#### **BP 7 – Leak detection and repair**

Inspection and maintenance of irrigation equipment can prevent water loss due to leaks and faulty equipment.

#### **BP 8 – Preconditioning turfgrass**

GCSs should adjust agronomic programs (e.g. mowing, fertility, cultivation, pest management, irrigation, soil wettability, etc.) to precondition turfgrass for minimizing water needs.

#### **BP 9 – Routine site surveys**

GCSs can routinely conduct a site survey of golf course areas under irrigation. These surveys help GCSs identify areas that may not require regular irrigation to remain healthy.

#### **BP 10 – Irrigation system audits**

GCSs can perform an irrigation audit every five years. The audit can be performed internally (i.e., by GCS and staff), but documentation of methodology and results should be maintained in the water conservation log. Irrigation system audits should include assessments of irrigation devices, distribution uniformity, and delivery lines, etc. This practice works in tandem with routine irrigation system monitoring, adjustments, upgrades, and repairs.

#### **Implementation Action:**

**3.10** MCGMA should work with irrigation manufacturers to identify systems and technologies that improve distribution uniformity contributing to water conservation.

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#### **BP 11 – Alternative water sources**

There are many ways golf courses that can use non-potable water as a primary water source. Golf course architects and construction companies can design for capture and storage of storm water within the golf course facility, so that it can be reused for irrigation. Golf courses may also want to work with local water providers, municipal governments, and wastewater treatment plants to obtain suitable quality water for irrigation<sup>6</sup>.

#### **Implementation Action:**

**3.11** MCGMA should work with an appropriate organization with expertise in golf course design (such as the American Society of Golf Course Architects ([www.asgca.org](http://www.asgca.org))) to identify specific design elements that could improve water capture and reuse within golf course facilities.

#### **BP 12 – Improve efficiency inside golf course facilities**

GCSs can work with the facility's general manager and others to identify methods and practices that reduce water use while maintaining sanitation and quality expectations. General Managers may want to take advantage of incentives offered by local and/or regional water providers or the state when available (such as toilet rebates or other fixture replacement programs.)

#### **Implementation Actions:**

**3.12** MCGMA should recommend BMPs for non-agronomic areas associated with golf course operations (e.g., clubhouse, kitchen, golf carts, pro shop, etc.) based on water conservation practices common to domestic water use.

**3.13** Local water providers should work with golf courses to determine the most effective way to improve efficiency and share educational materials.

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<sup>6</sup> In the summer, Huntley recycles a minimum of 34% of the water from its waste water treatment plant for use on its local golf course.